

WHAT IS CLAIMED IS

1. An engine control system for a combustion engine, comprising:

5 a NOx trap catalyst provided in the exhaust pipe of said engine to trap NOx by absorption or storage in an oxidation atmosphere and emit NOx in a reduction atmosphere;

a NOx sensor located in the downstream of said NOx trap catalyst to detect NOx components in exhaust;

10 a NOx trap catalyst model for estimating a NOx amount trapped in said NOx trap catalyst; and

a device that controls the operating condition of said engine based on outputs of said NOx trap catalyst model and said NOx sensor.

15 2. The engine control system according to Claim 1, wherein said NOx trap catalyst model estimates a NOx amount trapped in said NOx trap catalyst and a NOx amount in the downstream of said NOx trap catalyst based on exhaust components and an air flow rate.

20 3. The engine control system according to Claim 1, wherein said NOx trap catalyst model comprises:

a means for obtaining the air-fuel ratio and the intake air flow rate of said engine directly or indirectly;

25 a means for obtaining the predetermined NOx

density in the upstream side of said NOx trap catalyst based on the operating condition of said engine;

a means for obtaining the NOx amount flowing into said NOx trap catalyst from said NOx density and said
5 intake air flow rate;

a means for obtaining the predetermined NOx trap ratio based on said air-fuel ratio and said intake air flow rate;

a means for obtaining the NOx trap speed from said
10 NOx amount inflowing into said NOx trap catalyst and said NOx trap ratio;

a means for obtaining the predetermined NOx release speed in said NOx trap catalyst based on said air-fuel ratio and said intake air flow rate; and

15 a means for estimating the NOx trap amount based on the difference between said NOx trap speed and NOx release speed.

4. The engine control system according to Claim 3, wherein said NOx trap catalyst model replaces said NOx
20 trap ratio with a new NOx trap ratio based on a correction coefficient obtained from the estimated NOx trap amount.

5. The engine control system according to Claim 4, wherein the newly obtained NOx trap ratio is corrected
25 according to the output from said NOx sensor located

in the downstream of said NOx trap catalyst.

6. The engine control system according to Claim 3,
it is equipped with a tuning device that tunes the NOx
trap ratio obtained at said NOx trap catalyst model
5 based on the output of the NOx sensor by using online.

7. The engine control system according to Claim 1,
wherein a rich spike control is started when the NOx
trap amount in said NOx trap catalyst, which is
computed by said NOx trap catalyst model, or the
10 output of said NOx sensor exceeds a specified value.

8. The engine control system according to Claim 1,
wherein the rich amount or rich time required for said
rich spike is determined based on the NOx trap amount
in said NOx trap catalyst estimated by said NOx trap
15 catalyst model.

9. The engine control system according to Claim 3,
wherein the NOx trap ratio is corrected based on the
NOx amount detected in the downstream side of said NOx
trap catalyst during the rich spike of said engine.

20 10. The engine control system according to Claim
6, wherein the NOx trap ratio representing a NOx trap
capacity is provided in said NOx trap catalyst model,
and said tuning device adjusts the NOx trap ratio in
said model based on the estimated NOx trap amount.